DOCUMENT RESUME

ED 109 717 CS 501 087

AUTHOR Barber, Richard J.; And Others
TITLE Issues in Communication Planning for Hawaii.
INSTITUTION Hawaii Research Center for Futures Study, Honolulu.
PUB DATE 75
NOTE 56p.

EDRS PRICE MF-$0.76 HC-$3.32 PLUS POSTAGE
DESCRIPTORS *Communications; Communication Satellites; Delivery Systems; Information Networks; *Mass Media; Newspapers; Periodicals; Radio; *Statewide Planning; Telecommunication; Telephone Communications Industry; Television
IDENTIFIERS *Hawaii

ABSTRACT

Focusing on the resources necessary to serve Hawaii's present and future communication needs, this paper considers both the problems and the possibilities for communications developments during the next 50 years. Specific topics covered in the paper include communication needs, resources and technology (telephone, radio, television, newspapers, periodicals, postal service, telegraph), policy (state, interisland, long distance, intercultural, research), and planning issues. A bibliography lists both specific and general references. (JM)

ISSUES IN COMMUNICATION PLANNING FOR HAWAII

Richard J. Barber
Donald J. Grace
L. S. Harms
Jim Richstad

AN OCCASIONAL PAPER OF
THE HAWAII RESEARCH CENTER FOR FUTURES STUDY
HONOLULU 1975

ISSUES IN COMMUNICATION PLANNING FOR HAWAII

An Occasional Paper of the Hawaii Research Center for Futures Study, Social Sciences and Linguistic Institute, University of Hawaii, 2424 Maile Way #704, Honolulu, Hawaii 96822

Produced with the assistance of a grant from the Hawaii Bicentennial Commission, Horizons Committee

Biographical Notes:

Richard J. Barber is the Acting Director of the Hawaii Research Center for Futures Study and the Assistant to the Director of the Social Sciences and Linguistics Institute, University of Hawaii.

Donald J. Grace, Director of the Center for Engineering Research, College of Engineering, University of Hawaii, was instrumental in the development of a two-way, four-channel television teaching system for Stanford University, California.

L. S. Harms, Professor of Communication, University of Hawaii, is currently involved in a long range project on the development of world communication rights.

Jim Richstad, Associate Researcher with the East-West Communication Institute, Honolulu, Hawaii, currently serves as Executive Director to the Honolulu Community-Media Council.

PREFACE

Communication Planning for Hawaii is a project of the Hawaii Research Center for Futures Study supported by the Horizons Committee of the Hawaii Bicentennial Commission. Related activity will continue during 1975 and 1976 through a series of public discussions on the issues raised in and developed from this document.

While the responsibility for this paper is shared by only a few persons, valuable input over the past year has been made by a number of individuals. Through the Hawaii Research Center for Futures Study and its parent organization the Social Sciences and Linguistics Institute of the University of Hawaii, related discussions have been held regarding communication/transportation tradeoffs, experiments in the use of two-way cable television, and communication policy questions.

Thanks are due to Anson Chong, Horizons Committee Chairperson, and to David Holt and Mike Kilinski, WICHE interns with the Bicentennial Horizons Committee.

A special note of thanks should also go to Kathleen Ayumi Kie for her dedicated work as researcher and manuscript typist.

Copies of the first draft of this paper were sent for comment to the following persons:

Norman Abramson, Professor of Electrical Engineering, University of Hawaii
Karen Ah Mai, Research Associate, ALOHA System, University of Hawaii
Lawrence S. Berger, President, KHVH
Kenneth Brown, former Hawaii State Senator
John Bystrom, Director, PEACESAT, University of Hawaii
George Chaplin, Editor-in-Chief, Honolulu Advertiser
Anson Chong, Hawaii State Senator and Chairman of Bicentennial Horizons Committee
Godwin Chu, Researcher, East-West Communication Institute
James A. Dator, Professor of Political Science, University of Hawaii
Robert Englebardt, Service Director, Hawaiian Telephone Company
Edward Greaney, Press Secretary, Office of the Governor, State of Hawaii
Dick Grimm, General Manager, KITV
Janet Harada, Citizens for Community Cable
Stanley Harter, Communication Officer, State of Hawaii

[illegible], Professor, [illegible] Program, University of Hawaii
George [illegible], [illegible] Political Science, University of Hawaii
Ray Kirkendall, Executive Secretary, Advisory Council on the International Relations of the University of Hawaii
Hideo Kono, Director, Hawaii State Department of Planning and Economic Development
James L. Loomis, Director, Office of Information and Complaint, City and County of Honolulu
Theodore Merrill, President, Statewide Telephone Users Committee
Wayne Minami, Director, Hawaii State Department of Regulatory Agencies
Fred Morris, Jr., President, Tele-Sciences Corporation Washington, D. C.
Bosco Nedelcovic, President, Basic Livelihood Corporation
Glenn Paige, Political Scientist, Social Sciences and Linguistics Institute, University of Hawaii
Costakis Papacostas, Assistant Professor of Civil Engineering, University of Hawaii
Syed A. Rahim, Research Associate, East-West Communication Institute
Don Rich, Manager, KOFL Radio
Wilbur Schramm, Director, East-West Communication Institute
A. A. Smyser, Editor, Honolulu Star-Bulletin
. Lloyd Sommerlad, Chief, Division of Communication Research and Policies, UNESCO, Paris
Patrick Takahashi, Assistant Professor of Civil Engineering, University of Hawaii
Donald F. Topping, Director, Social Sciences and Linguistics Institute, University of Hawaii
Lewis Walkup, Scientist
Dan Wedemeyer, Graduate Student, Annenberg School of Communications, University of Southern California
Ray Yamaia, Instructor, Speech-Communication, Leeward Community College

The draft paper was discussed at a meeting of the Advisory Council on the International Relations of the University and at an Electrical Engineering Seminar. Comments from the several dozen persons in those groups were helpful to us in our revision process.

We are especially grateful for the extensive comments received from Robert Engler, Paul Heinberg, Fred Morris, Jr., and Dan Wedemeyer.

CONTENTS

INTRODUCTION

By design, this paper on Issues in Communication Planning for Hawaii is "in process." Its purpose is to continue the effort in "anticipatory democracy" begun by the Conference on Hawaii 2000 with a special focus on communication planning. This paper and the series of public discussions now underway is supported by the Horizons Committee of the Hawaii Bicentennial Commission.

The discussion is focussed on the communication resources necessary to serve the communication needs of everyone--present and future--in Hawaii. A communication conference to summarize the discussion and propose recommendations is planned for spring 1976. At that time, it should be possible to complete these first steps toward what we hope will be a continuing citizen input into the long-range planning process.

Throughout the discussion in this paper an attempt will be made to identify and/or define the communication policy, services, operational requirements and facilities to support the communication needs developed. Oftentimes communication needs and telecommunications operational requirements become so intertwined as to cause confusion. Such confusion can lead to misunderstandings between the social science planner and the "hard" science technologist/planner as they strive to define issues and evolve policy recommendations.

Problems and Possibilities in Hawaii

Can those of us who live in Hawaii plan our futures? We are but a small part of the world, about 6,425 square miles in a world of 57,506,000 square miles of land and another 139,500,000 square miles of ocean. Fewer than a million people live here; there are nearly four billion people on earth. How much influence can such a community have on the decisions which affect its future?

Hawaii is a state of the United States and yet is not provided equal treatment under U. S. law and regulation with the mainland states in provisioning of telecommunications services. In recent years we have become painfully aware that we are interdependent with other places [illegible]. But interdependence leads to problems [illegible] as gasoline shortages and to possibilities such as those inherent in satellite communi-

A frequent visitor to Hawaii, Robert Theobald, urges us to consider both our problems and our possibilities. Theobald also forecasts a major role for Hawaii as a Communication Center during the next half century--a time he calls the Communication Era (Theobald and Scott, 1972.).

Another frequent visitor, John McHale, points out that today few major problems anywhere in the world are entirely local ones. Population growth, ocean and air pollution, energy reserves and other problems are worldwide in scope. While we can participate in the solution of these problems, in most cases, we cannot solve them by ourselves--even as they affect us in Hawaii.

But we have major possibilities as well, and some of these possibilities are new ones. One such possibility is to be found in the area of communication: in Hawaii, our communication resources can become abundant. Today, we can have available almost any communications technology we require to serve our communication needs. We can have almost anything we **need**, but we cannot have everything we want. Economic and other **realities** influence technological developments. Even so, this is a new, different, and remarkably important state of affairs. Most of the thinking to date has assumed a scarcity of resources.

At the same time, we now begin to know how to shape communication policy to ensure that communications technology does indeed serve human needs (International Broadcast Institute, 1974). But there is a catch: we do not know enough about human communication needs to define technical and operational requirements.

We believe that one good way to find out about communication needs in Hawaii is to ask each other--seriously, carefully, and systematically--in a series of public discussions to define, point out, or present examples of our communication needs. We hope to obtain the broadest possible participation in these discussions. Thus, it is our intent to continue the Hawaii 2000 discussion and dialog.

Communication, communications and telecommunication(s) are terms which are often used interchangeably, sometimes causing a bit of confusion. We have tried to be consistent in this paper by using the term communication to refer to the broad range of ways in which man and machine pass messages--through verbal communication, printed messages, and electronic means. In general we have avoided the [illegible] terms. Telecommunication(s) refers to that [illegible] of communication which is conducted over a distance by electronic means such as radio, telephone or telegraph.

Communication as a Planned Resource

Little by little, as we prepared this paper, we began to talk about communication as a resource. We got to this point from our concern with the basic issues that cluster around communication needs, technology and policy. Resources are the stuff we use to satisfy, meet, or serve needs. Most simply, resources are useful (Resources and Man, 1969).

Of course, communication resources cannot be totally separated from other kinds of resources--transportation, energy, food, housing, and all the rest. But we can separate communication resources from other resources just enough to discover some unusual things about them.

Most resources can be classified as either nonrenewable or renewable. Fossil fuel energy, for instance, is not renewable, at least not for millions of years. Under certain conditions, nuclear energy may be renewable. Some parts of communication resources can be seen as being nondepletable; they cannot be used up. John McHale says that when communication is cooperative rather than competitive, the information part of communication resources is not depleted by use; often information increases through cooperative use, by interchange (McHale, 1972:195). Public discussion, citizen participation in local government, and the Hawaii 2000 effort in anticipatory democracy illustrate this point: they generate new information! Consideration must also be given to the fact that the per message cost of communication systems and data storage and transmission has been steadily and rapidly declining. This trend is likely to continue into the future, making the cost of the communication resources quite small in comparison to today's costs.

Also, the conservation and/or development of most other resources such as transportation and housing depends on adequate communication resources. The exact nature of what is or ought to be the relationship between communication resources and other resources requires further discussion as do the distinctions between technical telecommunications means and communication requirements supporting the resources.

The Key Question

Communication may be treated as a resource, something which meets certain needs of individuals and societies. It appears likely that there could be enough for everyone--present and future. [illegible] clear that if the communication resources in a society are to be abundant, their development must be planned. For the most part, the communication resources we use today have developed more or less by chance or as a result of limited commercial interests and governmental requirements.

We find that we are at a turning point. At this time, in Hawaii, we can plan the development of communication resources to more fully satisfy the needs of everyone--not just the community leaders, the rich and the powerful, or a particular group, but everyone.

In the past, policy formation has usually followed technological innovation and diffusion, often with unintended and undesirable consequences. We are now at a point when we must put human needs first, technological possibilities second, and then develop policy on the relationship of technology to needs. This document follows that sequence.

The question before us is:

How can we develop the communication resources required to satisfy our communication needs?

A related question is:

To what extent are operational telecommunications services and facilities available now to satisfy our communication needs and, where not available, how can they be provided, at what cost, and who will pay for them?

COMMUNICATION NEEDS

In Hawaii as elsewhere in the world, those who seek to plan the future become aware that "the discussion and research alternatives for the world should be focused on the principal issue--Human Needs" (IRADES, 1974). In the past, there has been little public discussion or systematic research on human needs. At present, there does not appear to be in Hawaii or elsewhere a public consensus on what the basic human needs are, and how such needs might be satisfied or gratified. In the future, our interests in long-range planning will require that we do know what human needs are, and whether they are stable or changing. Some futurists assert, for instance, that human needs are changing at a rapid rate. For a variety of reasons, communication planning requires that we be well-informed about human needs in general and more specifically our communication needs--present and future.

Human Needs

The general concept of human needs has been the subject of occasional inquiry and advocacy. Quite often such inquiry has been informal and present oriented. For instance, a thoughtful group of friends meet one evening each month to discuss their personal life goals; from their discussion they conclude that their major goal should be to serve human needs; after further discussion, they decide that there are just four human needs. Or, as a very different instance, a political theorist advocates the revolutionary idea that the resources of a society should be allocated to its members "each according to his needs" and, as an unintended consequence, raises the fundamental question: what is the relationship of needs to the scarcity or abundance of resources. Other instances can easily be added, but the point would remain the same: information on human needs gained from public discussion and systematic research remains scarce. Fortunately there are some exceptions.

The work of the psychologist Maslow constitutes an often cited general body of writing on human needs (Maslow, 1970). He asserts that each human is a "biological system encountering ever-occurring needs." Maslow makes the further assumption that human needs can be divided into two types--basic and created.

Maslow identifies and orders basic needs as:

- physiological needs such as air, water, food, shelter, sleep, sex;

- safety and security needs;
- love and belongingness needs;
- esteem (from self and others) needs; and,
- growth needs such as aliveness, order and meaningfulness.

Related needs would include, for example, "desires" and "wishes." While the Maslow work has a number of strong features, certain difficulties have been encountered when applications have been attempted (Huizinga, 1970).

Communication Needs

Wide agreement can be secured for the claim that there exist real human communication needs. In the most general sense, case studies of children who have been "isolated in an attic" or "exiled to the forest to live with the animals" document that when the capacity for interpersonal communication does not develop, neither do most of the other characteristics we use to define ourselves as human beings. Also, prolonged periods without communicative interaction lead to a general deterioration of human capacities, as prison camp studies have illustrated. On a broad and gross level, these and other available facts support the claim that humans need to communicate with each other to become and remain human. Most simply, communication needs exist.

To date, there has been no large-scale attempt, either through public discussion or systematic research, to define or identify the full range of human communication needs, and to inquire about their relative importance. A UNESCO Regional Seminar for Communication Planners held at Kuala Lumpur in December 1974 (UNESCO, 1974) emphasized again the importance of knowing what communication needs are to be served; how these needs relate to social structures; and, how the identified needs are associated with various social and cultural objectives. These concerns resemble others to be found in still other recent UNESCO documents and in the national communication planning documents of Canada (English, 1973), Australia (Telecommunication Plan ..., 1974), and other countries. There is a recent and widespread recognition of the importance of basic human communication needs--and how little we know about them.

This present interest appears to emerge from two new conditions:

1. Communications technology can now be developed to serve almost any communication need; after centuries of scarcity of communication technology, suddenly it is or can be abundant. However, there are serious restrictions to its availability to most.

2. Communication policy, once communication needs are known, can guide the development of technology to ensure that communications technology does indeed serve communication needs; a review of existing communication policies show that some of them still assume that technology must remain scarce as indeed it is in many parts of the world.

These two new conditions are developed more fully in later sections of this paper.

A program of discussion and research--both worldwide and in Hawaii--on communication needs can be expected to yield:

- a set of criteria for defining a communication need--How do you know one when you find it?
- a list of defined communication needs--How many are there? How are they unique?
- a procedure for organizing defined communication needs--Are some communication needs more important than others? How much so?
- a procedure for translating communication needs into technical and operational requirements--How can operational capabilities and facilities be acquired and made available?
- a procedure for estimating the quality and quantity of the communication resources and incident communication facilities necessary to satisfy the communication needs of a community--What do we require in Hawaii, intrastate, interstate, and international?
- a procedure for monitoring communication need satisfaction in a community--How do we know communication needs are being met?

If the communication resources of Hawaii are to be planned and developed for the purpose of satisfying the communication needs of everyone in Hawaii, a substantial amount of discussion and research will be required together with financial support, including capital investment.

At the beginning of our inquiry into human communication needs, it is useful to know how precisely communication needs must be defined. At this early stage, a preliminary answer appears to include these two points:

1. a communication need must be known precisely enough to decide what kinds of communication technology, if any, are required to serve that need.

2. a communication need must be known exactly enough to determine what communication policies, if any, are required to be sure that technology serves that particular need.

It is our expectation that public discussion will enrich understanding of this basic question. But also, we anticipate that experimental use and study will be required.

Present Practices

At present, routine attempts to study communication needs are usually made within the framework of an existing technology or policy. A few illustrations can help make this point clear.

The airwaves or radio spectrum are "public domain" and are to be used for the "public interest, convenience and necessity." Consequently, a license is required to "reserve" a portion of the spectrum for any particular use. A broadcast station, for instance, must ascertain the needs of the community it serves (Baldwin and Surlin, 1970). There are federal and other guidelines for needs ascertainment. The usual procedure involves the interviewing of community leaders (Surlin and Bradley, 1974), and other members of the community. Questions like the following ones are usually asked:

- What do you see as the major problems in your particular area of influence or interest?
- What, in your opinion, are the major problems or needs of the community as a whole?
- Are there some ways in which you think the broadcast media might be more helpful in addressing themselves to some of these problems?

While the information obtained from answers to questions such as these is helpful for programming decisions, the questions asked about TV broadcasting often assume that this 25 year old use of technology is unchanging and unchangeable. Specifically, broadcasters do not inquire whether the airwaves spectrum might be differently used to better serve the needs of the community, nor do they ask what the full range of communication needs of the community might be. The questions asked are usually about a particular broadcast service rather than a

communication service. We stress this point because a major study by Katz in Israel on the uses of the mass media showed that even for those communication needs that mass media were supposed to serve best, in most instances, something other than mass media served or could serve those needs better! (Katz and others, 1973).

Similarly, when schools inquire about student needs for training in communication skills, they usually ask about skills that can be learned in schools as they now exist and operate, as the "needs assessment" investigations illustrate (An Assessment ..., 1970). It should be added that CATV, the press, and other interest groups tend, as commercial broadcasting and the schools do, to inquire about only those needs that can be readily served within the confines of existing technological or institutional structures.

There is an instructive local counter example in PEACESAT (PanPacific Education and Communication Experiments by Satellite) (Bystrom, 1974). In this instance, systematic attempts are being made to discover and clarify how to serve human needs for communication through inquiries made of potential and actual users. Interestingly enough, most of the uses of PEACESAT have been for consultation, seminars, and information interchange of many kinds--in other words, uses not at all like a commercial broadcast station's program or a classroom lecture. The PEACESAT experience raises again the question formulated by Katz. Do basic communication needs tend to require two-way communication? (Katz and others, 1973).

Policy changes now underway in Hawaii should enable greater citizen participation in public meetings. From public concerns expressed about closed meetings, decisions made in smoke-filled rooms and the like, action is being taken to respond to a need for participation. But if such a need for participation exists, what are its full dimensions? There are a number of related questions including the rescheduling of meetings to appropriate hours, making meetings available on cable and, in general, developing the community wide communication resources necessary to make the policy an effective and economically supportable one.

As a related example, when a radio station begins a talk show or "participatory format," communication skills of a particular type are needed that were not developed in the earlier "passive listener" era of radio (Turow, 1974). Across a lifespan, most of us will need to develop new communication skills from time to time.

Policy change without resource development is unlikely to yield useful results. The basic communication need will probably remain unknown and unmet unless additional probing follows.

Areas of Communication Needs

Permit me to say again that we do not yet have an adequate listing of communication needs in Hawaii, or for that matter, anywhere else in the world. However, it seems likely from the evidence currently available, that at least three broad areas of needs will be evident here and elsewhere. These communication need areas are:

- information needs
- interpersonal needs
- personal needs

They will be discussed briefly in the following paragraphs.

Information needs present a perplexing problem. On the one hand there is an explosion in information. There is an unquestioned abundance. Yet, urban residents, in particular, seem to require more information than ever before to solve their problems and develop their possibilities. But many persons--urban and rural--are unable to obtain the information they need for their daily living.

In an extensive examination of the information needs of the "average" citizen (Dervin, 1974), it was found that most persons needed more information than they knew how to obtain on:

- neighborhood, such as city services, traffic and parking
- consumer, such as product quality, prices
- housing, such as loans, landlords
- housekeeping and household maintenance, such as home improvement codes
- employment, such as getting, keeping or changing jobs
- education and schooling, such as adult services, PTA actions
- health, such as cost of health insurance, coverage, services
- transportation, such as bus schedules, automobile insurance
- recreation and culture, such as playground supervision
- financial matters or assistance, such as tax problems, credit
- public assistance and social security, such as Medicare benefits
- discrimination and race relations, such as racial [illegible]
- child care and family relationships, such as day [illegible]
- family planning and birth control
- legal, such as contracts, legal interpretations
- crime and safety, such as tax law enforcement

- immigration, migration and mobility
- veterans and military, such as benefits, rights, discharges
- public affairs, political, etc., such as locating an agency.

Even in a partial listing of information needs, it becomes evident that a variety of communication services are required. The mass media do not, cannot and, indeed, are not intended to serve specific needs such as these for any person or family (Katz, 1973).

Interpersonal communication needs appear to be changing, in part, because so much of the information needed to survive in a city must be acquired from impersonal sources: operating manuals, strangers, phone books, street signs, computer terminals, and the mass media. When information needs are high, even interpersonal communication face-to-face in a bank or with a salesman over the phone is likely to be brief, businesslike, mechanical--impersonal. Television viewing, newspaper and book reading and other mass media usage reduce the time available for satisfying interpersonal communication needs.

~~At a much earlier time, human information exchange~~ took place within the context of interpersonal communication. Until printing was widespread, almost all information of use was stored in some other human brain. Communication resources only included other people. In recent years, there has been much speculation on the nature of the human need for interpersonal relationships, ethnic identity, cultural context and the like. As impersonal man-machine communication increases, it seems likely that the interpersonal communication needs will become of greater concern.

Personal communication needs are usually called privacy. The interest in privacy, in part, grew out of the problem of "protecting the privacy" of public figures and their families from newspaper reporters. In recent years, two additional concerns have been added. One of these comes from the fact that vast quantities of information are collected about a person--credit, income, etc. --and stored in computers. At this time, an individual has rather little control over the use of such information. A quite different concern arises from the intensiveness of communication activity that many persons experience during a working day: a report must be finished before a meeting, the phone rings, someone "in town" only for a few hours knocks on the door, an assistant needs a set of complex instructions clarified, and communication stress or overload occurs. A variety of factors give rise to a personal need for privacy.

Also, there appears to be another part of the personal communication need. A person sometimes needs peace and quiet to "think through" and develop personal opinions. And this need requires a temporary shield from outside communication.

As these communication need areas are clarified and others added to enlarge the list, it seems likely that communication resources will develop in a quite different quantity and quality than has been the case up to now. How, for instance, are the information needs of a community member served by having three similar TV newscasts broadcast at 6 o'clock each weekday evening? As the next section shows, a wider variety of communication technologies could be used to serve communication needs in Hawaii than are presently being used.

Finally, we can classify by form of communication, the principal types for humans are graphic (hard copy) and audio and visual, either live or stored; for machines, electrical or mechanical forms, live or stored.

Historical Overview

Probably, the process of communication is even older than mankind. Animals use one or more of the five senses for daily survival as well as more "personal" exchanges.

The technology of communication was enormously advanced by early man through the articulation of sounds into speech for more sophisticated and direct, real-time interchanges; speech was also used for stored communication by the telling and retelling of history, tribal laws, and other information considered to be of value from generation to generation.

Many early cultures independently developed graphic means for storing communication through drawings, as exemplified by the petroglyphs of Hawaii. Perhaps the next step was the development of alphabets, which made possible the storage of speech by means of the written word. The printing press enormously reduced the labor and cost of reproducing written words, thus expanding the availability of this means of communication and leading to the mass publication of books, newspapers, and periodicals. In more recent times, the development of photocopying processes, notably xerography, has significantly extended our individual capability to reproduce materials and increase the distribution of written communication.

Invention of the telegraph in 1837, less than 140 years ago, established a whole new means of communication, since for the first time, information could be conveyed at a distance almost instantaneously by means of electrical signals transmitted through wires. This marked the beginning of telecommunications technology. Thirty nine years later, the telephone was invented, making it possible for speech to be transmitted by wires. The 1890's produced the discovery of radio signals, permitting transmission of information through the atmosphere without wires, followed in rapid succession by wireless telegraphy and the wireless telephone. Meanwhile, a unique form of storage and reproduction of audio information was established by the phonograph in 1877, with the magnetic tape recorder coming at the turn of the century.

Stored visual communication was revolutionized by the invention of photography in 1837. The first wirephoto was sent in 1831, adding a telecommunications capability for transporting visual images. Color photography was demonstrated in 1892 and silent movies two years later.

COMMUNICATION RESOURCES
and
COMMUNICATIONS TECHNOLOGY

Almost every community uses a variety of communication resources. We can now inquire about how well these resources serve communication needs at present and what new services and supporting technologies will be required in the future. Most of the technology pertinent to this discussion lies in the field of telecommunications.

Classes of Communication

It is useful in examining communication needs and alternatives for the future to classify the various modes in terms of their objectives. On such classification (Gifford and Smith, 1973) is the following:

- personal (one-to-one, or point-to-point)--direct conversation, telephone, mail
- small group (one-to-several or point-to-points, limited)--committee meeting, teleconference
- mass flow out (one-to-many or point-to-points, broad)--newspaper, television, movie
- mass flow in (many-to-one or points-to-point)--polling, applause

Another classification is:

- man to machine--computer programming, manual control
- machine to man--computer output, instrument panel
- machine to machine--data communication, switching systems

Yet another classification can be by information rate:

- slow speed--yes/no, on/off, etc.
- telegraph message
- telex
- slow speed to high speed data (with or without error correction)
- telephone voice
- high quality voice-music fidelity
- low grade television (black and white or color)
- high quality television (black and white or color)

The development of sound motion pictures in 1927 was the first major technological breakthrough in combining audio and video communication in a reproducible stored form. A scant seven years later, telecommunications technology produced broadcast television, providing a format for communicating both sound and voice simulataneously and instantaneously at a distance. Until the later development of kinescope and videotape, there was no convenient way to store, edit, and repeat the information. Today, we have cable television systems with 20 to 40 channel capacities in a single coaxial cable.

Electronics has played the major role during the late 19th and the 20th century in the rapid development of telecommunications technology. Highlights include the first vacuum tube in 1904, the vacuum tube amplifier three years later, the transistor in 1948, and the laser in 1960. Continuing advances in integrated solid state circuits, microelectronics and fiber optics are being made which will further influence future communication systems.

Computer technology has also become an integral part of modern communication, although this interaction was hardly foreseen when its forerunner, the first digital calculating machine, was disclosed in 1823. Electronic computers were born in the 1940's, using vacuum tube technology. The phenomenal growth of this industry in recent years is attributable in large part to solid state electronics. In many of today's computer sytems, it is difficult to separate the communication and data processing functions; conversely, sophisticated communication systems lean heavily on computers to perform switching, regulate traffic, select alternate routes, handle billing, and handle a myriad of routine tasks. The implications of this synergy between computers and communication is fundamental to our ability to predict and plan for the future of communications technology.

As with computers, technical advances in other fields which initially appeared to be unrelated have subsequently altered the course of communication practice and planning. German research and development of rockets during World War II was the forerunner of the Russian Sputnik satellite launched in the late 1950's, and in 1965 the first international commercial communications satellite was placed in synchronous orbit over the Atlantic Ocean.

Almost immediately thereafter this satellite was [illegible] and an international system of satellites was established serving the entire world. The system is jointly owned and operated by the designated telecommunications entities of 89 nations of the world.

Even a cursory review of the history of communication resources provides us with some useful clues in planning for the balance of the 20th century and the decades beyond:

- the rate of advance in telecommunications technology is accelerating, with the interval between significant new developments being reduced to years rather than centuries
- new technologies in other fields can sometimes produce major impacts on telecommunications
- communication serves not only as an end unto itself, but also as a vital ingredient in other processes
- we already have more telecommunications technology and installed facilities available today than we have fully assimilated into society, with the promise of rapid and enormous improvements as well as new offerings yet to come
- past efforts to project the long-range impact of emerging technologies have almost invariably underestimated the potential, particularly for interactive utilization with other technologies
- each advance in telecommunications technology has exerted a major influence in the social, economic and political sphere as well
- while communication planning for Hawaii may not significantly affect the course of technological research, such planning must include a continuous monitoring and assessment of new developments, in addition to regulatory restrictions and government policies.

Case Example: Telephone Service in Hawaii

To provide some insight into the growth and application of telecommunications technology in Hawaii, the evolution of telephone services in the Islands is offered as a case example.

Less than two years after Alexander Graham Bell obtained his patent in 1876, there was a three mile telephone link in operation on Maui (Simonds, 1959). By 1880, there were 47 telephones in operation on Oahu, and at the turn of the century, the number had increased to about 1,400.

By 1940, there were some 40,000 telephones in Hawaii (State of Hawaii Data Book, 1974), a ratio of one phone for every 11 persons; in that year, a daily average of seven local calls per phone were made, while the annual average of interisland calls per phone was 1.1 and one transpacific call per year was made for every four telephones. In 1973, there were 524,000 telephones in Hawaii, corresponding to about two phones for every three persons; the daily average of calls was down significantly to about five per phone, but the annual average of interisland calls was up to seven per phone, while the transpacific yearly average soared to 13 per phone. Over one billion local calls were made in Hawaii in 1973, with almost 4 million interisland calls and about seven million transpacific calls.

The monthly charge for an individual residential telephone was $6.00 in 1880, falling to an all-time low of $2.00 by 1890. Since then, it has risen more or less steadily to the present (1974) rate of $9.50 for a one-party residential line on Oahu. While monthly service charges have been increasing, however, interisland, interstate and international rates have come down significantly. In 1930, the daytime station-to-station three minute rate from Honolulu to Hilo was $9.00, and to San Francisco $21.00. By the end of 1974, corresponding rates were $.90 interisland and $2.40 to western mainland states (plus tax) for direct-dialed calls, with night rates of $.60 interisland and $1.80 to western states for direct-dialed calls. Private line voice channel rates to the West Coast decreased from $20,000 per month in 1957 to the present rate of $4,150.

Despite the significant reductions, these rates are roughly twice those paid in the mainland states for services over approximately the same distances. A uniform mileage rate pattern has not as yet been extended to include Hawaii.

The telephone has now achieved the status of being a business necessity and a personal need for practically the entire population of Hawaii. We are linked to the mainland by four undersea cables (three to the U. S., one to Canada), capable of carrying 1,268 simultaneous conversations, and by two cables to other Pacific countries such as Japan, the Philippines, and Australia (via Guam and Fiji) with a capacity of 222 simultaneous conversations. A second cable to Japan via Guam is being added now which will increase the number by 845. Two international satellites, operated by COMSAT, have a capacity in excess of 7,2[illegible] simultaneous calls (COMSAT, 1974). Ten interisland microwave connections link our islands to each other, [illegible] additional 24 are used for intraisland communication.

The first time telephone lines were utilized for remote computer operation was in 1940 between New York City and Hanover, N. Y. Since then, telephone lines have been used increasingly for interconnection of computers with each other and for human interface with remote computers. Conventional dialed telephone connections have their problems, however--the circuits were designed for voice. Teletypewriter speeds are too slow for high-speed data transfer. Noise bursts not very noticeable or irritating in conversation produce multiple errors for computers. Finally, the cost of sending data moderate to long distances over a switched-telephone network can be high. Specialized wideband systems have been developed, utilizing the equivalent of 12 to 24 voice channels, but standards of quality, type of switching, transmission method, speed and capacity have yet to be uniformly agreed upon. Nevertheless, many hotel and airline reservation systems, as well as national credit card networks operate very successfully in this way.

In Hawaii today most telephone system links to computers are made via conventional voice-grade lines, with teletypewriters or audio couplers serving as the interface between the human operator and the computer. There are some private line networks using "conditioned" circuits whose quality is somewhat improved over conventional lines, sometimes with special tailored characteristics. The one non-military wideband system is the ARPA network which links Hawaii with the mainland. In addition, there are a number of military wideband lines used for secure voice communications.

Mobile radio telephone service in Hawaii (not to be confused with police and taxicab radio systems) has developed one step beyond the mainland. Since few, if any, mobile telephone equipped vehicles enter the islands, compatibility with the Bell designed system is unnecessary. The system provided by Hawaii Telephone Company allows calls to be placed or received by the mobile unit on any channel which is not busy. Selection of the vacant channel is entirely automatic. The system can accommodate more subscribers than a comparable mainland system using the same number of channels. The problem, both in Hawaii and on the mainland, involves expansion of the system as a result of limited frequency assignments available. FCC policies lean more toward mass communication than toward personal communication. The UHF band, which would be technologically desirable for mobile use, has been assigned to TV rather than mobile telephones. In Hawaii we have no UHF TV stations and small prospect in the near future, so perhaps an exception could be sought. However, such specialized equipment designs would have a limited market and thus a higher price. There are also technological difficulties in mobile systems. Good service over a single island would require diversity reception, i.e.,

selecting the best signal among two or more antennas, both at the vehicle and at the fixed stations, with automatic switching even in the middle of a call. The problems can probably be solved, even economically, if the potential demand is great enough and priorities are given to appropriate (if not optimum) and permanent frequency allocations. There are value judgments here that supersede the technical considerations.

Hawaii now has Direct Distance Dialing (DDD) inter-island and to the mainland. Operators are still used to record the caller's number in the smaller telephone central offices. Within the next few years, all offices will be equipped with automatic calling number identification. We have the Wide Area Telephone Service (WATS) for inter-island calls, but not to the mainland. In this system, a flat rate monthly charge is made for unlimited long distance calls within one or more specified regions; the mainland is now divided into five such regions.

Hawaii also does not have domestic rates for long distance interconnection for special functions, as are available throughout the mainland, e.g. television transmission and specialized telecommunications services for transmission of data, facsimile and record traffic.

Hawaii-mainland U. S. telegraph message, telex, record and data communications services are provided exclusively by international carriers and at rates significantly higher than those enjoyed throughout the mainland states where such services are provided by the U. S. domestic telegraph carrier (Western Union Telegraph Company) and specialized carriers in open competition.

What future changes can we anticipate in the way of telecommunications service and rates? The most significant near-term development, requiring no technological breakthrough, will be domestic satellites, which should be a reality for Hawaii within a year. With domestic satellites, Hawaii's long distance telephone rates to mainland states should approach, if not equal, those on the mainland and the special services mentioned earlier should not only be commonly available, but at comparative rates. This will not only increase our access to new communications technology, but also enormously expand our usage of existing capabilities.

Hawaiian Telephone has begun introducing electronic switching which has greater reliability and service capability, is far faster, requires less space and is [illegible] company is also proposing a transpacific [illegible] between Hawaii and the mainland. A variety [illegible] speeds ranging from 75 bits per second [illegible] is planned.

Although we can talk via the telephone, we cannot see the caller. The Bell System developed the Picturephone several years ago, which was demonstrated successfully in a purely technical sense, but it has been a dismal failure economically. The first problem is psychological: how important and desirable is it to the user? If it is a loved one or a close business associate at the other end, that would have a value, but how about a bill collector, a salesman or the telephone operator? Second, the terminal equipment costs some tens of times as much as the basic telephone; what is occasional use worth? The third problem involves transmission cost, since the bandwidth required is up to 200 times as much as that needed for a good voice reproduction. Finally, there is the usual marketing problem: until there are many terminals to communicate with, who wants to pay a high price to be connected?

Telephone usage in Hawaii continues to increase far more rapidly than the population. Services are steadily improving while the costs for local usage tend to increase and the costs for long distance decrease. Hawaii is an important link in the routing of international trans-pacific communication. Besides the convertional use of telephone company facilities for conversations between two individuals, they will be utilized increasingly for data transmission, computer interfacing, radio and television transmission from the mainland, teleconferencing, facsimile and in combination with other communication media, as, for example, in the radio talk show format.

Broadcast Radio and Television

Commercial AM radio broadcasting began in Hawaii in 1922, and the first FM station was established in 1953. Today, there are 25 AM stations and 7 FM stations involved in commercial broadcast, with one FM educational station. A wide variety of fare is available, with many of the individual stations specializing in particular forms of programming: rock music, an all news format, telephone discussion with listeners, sacred and classical music, Hawaii music, country and folk music, Japanese-speaking listeners, Filipino listeners; others offer a mix of these and other types of program elements.

Broadcast television came to Hawaii 23 years ago, and now there are five stations on Oahu, with a total of seven satellite stations on neighbor islands. Of the five primary stations, all three national networks are represented, one station is independent, and one is educational.

Primarily for economic reasons, most of our remote radio and television programming is broadcast a week later than on the mainland. Special news programs and major sporting events are notable exceptions; these are relayed by satellite at costs based on international rates. With domestic satellites and lower rates, more of the programming can be live, or perhaps delayed by a few hours because of the time zone differences. However, this communication need is not yet well-defined.

Regarding frequency spectrum allocated by the FCC for broadcast radio and television, there is room for additional stations to be licensed in Hawaii. Expansion of these communication media is not presently limited by technology or federal restrictions. Rather, the problems are in terms of limited overall market size, population dispersal (especially on the neighbor islands) coupled with terrain barriers, and economic considerations. There is no scarcity in a technological sense of broadcast radio and television channels in Hawaii. In fact, Hawaiian Telephone Company is being allowed use of otherwise TV-designated frequency assignments (channels) for its conventional microwave point-to-point services.

Cable Television

Another factor affecting growth of the broadcast media is Cable Television (CATV), which can become an important communication medium in Hawaii. Originally conceived as a method for providing improved reception from existing broadcast television to customers who were remote from urban transmitters, CATV expanded to include city dwellers plagued by interference from high rise developments, and more recently to providir significant additional programming services to attract new subscribers who are already in good reception areas. Cable franchises in Hawaii are awarded by the State Department of Regulatory Agencies, on the basis of census tract boundaries, with no overlap between operator areas. There are now five companies covering Oahu, one on Kauai, three on Hawaii, and one on Maui with two additional franchises pending. As a condition of its franchise, each company is required within two years of award to make cable service available throughout its area, provide a free cable connection for each public school, and dedicate at no cost one channel for educational use, one for public access, and one for government use. There were 650 miles of installed plant in April 1974 but by September 1975, there will be more than 1,200 miles, a 100% increase in 17 months. Much of the new cable being installed will have a capacity greatly exceeding present plans for usage, allowing for subsequent expansion as the demand for additional types of service develops. For example, one system being installed on Oahu can accommodate up to 30 channels of television

from the studio and two video channels of capacity back to the studio. In addition to carrying commercial broadcast television, some do or will offer FM radio, stereo music, additional television programming, uninterrupted movies, news reports, weather service, and local announcements. Although the regional coverage of a CATV system is limited to its franchise area, interconnection of CATV systems for broader (even Statewide) distribution is quite feasible technically if and when the demand and economics are in balance. Provision for some forms of two-way interactive utilization of CATV is also being built into the newer distribution systems being installed, although at present there are no specific plans for implementation.

Newspapers and Periodicals

Hawaii has two English language daily newspapers headquartered on Oahu, with a combined circulation of over 200,000, and one daily newspaper on the Big Island with over 15,000 subscribers; Maui and Kauai have weekly newspapers. In addition, there are two Chinese and two Japanese daily newspapers.

There are at least 26 other civilian publications, ranging in frequency from semi-weekly to bi-monthly, plus 16 military publications. Individual periodicals are geared to a wide range of different readership interests: tourists, communities, construction, business, religion, youth, politics, and labor.

Much of today's technological innovation in the newspaper field centers around the use of computers, interactive displays and electronics to permit more automated makeup of individual pages, more rapid error correction and production of higher resolution copy for optical platemaking. Improved facsimile techniques permit transmission of photographs or whole pages of text ready for platemaking from overseas in a matter of minutes. Again, lower rates and new flexibility of services anticipated from domestic satellites should encourage greater utilization of this process.

Postal Service

The number of individual pieces of mail originating in Hawaii has climbed at an average rate of about 7% per year over the past eight years. In 1973, over 226 million pieces were handled; gross receipts of the Post Office in Hawaii during the same year were about $27 million. While rates have continued to climb, service

has not improved accordingly and in many cases appears to have deteriorated. Postal service is inherently a labor-intensive and individualized means of communication; approximately 85% of the national post office budget is spent on salaries and employee benefits. Efforts have been made and are continuing to increase efficiency and reduce costs. As an example, zip codes do assist in manual sorting and routing; experimental electronic zip code sorters have been built, but their main operational difficulty lies in adapting to the variability of hand-writing and placement on the envelopes, a feat which is far simpler for humans than machines. So-called "electronic mail" is a current research area. However, the established and successful MAILGRAM service offering of the U. S. Postal Service throughout the mainland states and Canada in cooperation with Western Union Telegraph Company has not been allowed to be extended to Hawaii from the mainland U. S.

Telegraph Message Service

Telegraph message service by cable between Hawaii and the mainland commenced in 1901; this mode was supplanted by radio links in 1912, and in 1951 cable service was terminated. The number of telegraph messages transmitted between Hawaii and the mainland reached a peak in 1966 of about 589,000 and has since decreased to about 65% of that level (387,000 in 1973), despite the fact that the cost has remained constant at 21 cents per word sent since 1960. During that interval (1966-1973), automatic teleprinter exchange (telex) service was established while transpacific telephone service improved in quality and lowered in cost, thereby increasing calls by a factor of 3.

Other Communication Resources

Many other communication resources are in common usage in Hawaii. Motion pictures, theater, books, records, audio tapes, tape recorders, closed circuit television, video tapes, ham radio, teletypewriters, and personal conversation are additional examples. No attempt is made here to generate an exhaustive list. Technological advances will undoubtedly be made in some of these, but the major thrust of long-range communication planning for Hawaii will need to be focussed on the previously discussed resources and especially on the potential improvements and applications to become available through telecommunications technology.

In ... the future of communication and its role in the development of society, the concept of the "wired city" exemplifies ... of the functional telecommunications capabilities for which a need has been established and for which the basic components are available (Communications Technology ..., 1971). One can view a city as a large information processing system in which much of the work going on is in the access, processing and exchange of information, either for direct use or for indirect service to the physical functioning of the city.

At the individual person-to-person level, we already have in the telephone a full two-way random access network that can accommodate voice and data. As individualized data processing needs and capabilities evolve, this same network can be used more extensively for man-machine and machine-machine random access interconnection between any two terminals on an as-needed basis. A video capability could be added if economically justified.

For distribution of information in bulk from central facilities to offices or homes, a broadband network with 30 or more outgoing television or high speed data channels is often proposed; limited information-carrying capacity in the return direction would also be provided for call-back to a central facility for polling, making requests and revenue record-keeping. Localized subcenters would be interconnected with a full 30 channel two-way capacity. This second communication network corresponds essentially to the modern CATV systems now being installed in Hawaii.

A third network, provided with the equivalent of 30 or more broadband channels in each direction would interconnect the major public institutions in the city--city halls, hospitals, schools, libraries, police stations, airports, etc. Some permanent interconnections might be ... between certain institutions, but others would be patched-in ... on schedule or on demand. Here again, the technology is available, but much interdisciplinary planning, definition of requirements and economic justification are needed for implementation.

Finally, a fourth network, probably with much less information capacity, could provide specialized information to key locations ... regarding such critical matters as weather, pollution, traffic, bus location and loading, ... Individual elements of this network already exist, but there is a growing need for much more ... accurately determined and better ... justification must be considered.

As a logical extension of the wired city, we can visualize a similar interconnection of cities, states and countries. The basic international network already exists around the globe; elements of national and local networks, in varying degrees of sophistication, are to be found in most American cities; the third and fourth networks pose no fundamental technical barriers. Once more, the need must be defined, appropriate policies are required, and economic aspects must be resolved.

An innovative system for intergovernmental communication in the New York-New Jersey-Connecticut metropolitan region has recently been implemented. The many counties and municipalities in this area formed the Metropolitan Regional Council (MRC) to design and operate a microwave interactive two-way television network linking 17 major cities and counties together. The system permits two-way video interconnection with the central facility or between any two of the community studios, with one-way video from each community studio to its home areas.

Home Information Centers

For a slightly different view of future communication utilization, we can visualize the functions that might be available in a home information center, following the model of the wired city. The telephone, with a video capability, could serve as the backbone for person-to-person and person/machine interface with worldwide random access connections available (Pierce, 1974). A 30-channel, CATV-type system will not only relay commercial broadcast radio and television programs, but will permit selection from a host of regional information programs (local news, sports, weather, shopping information, etc.). Upon interactive request through the return channel, a subscriber can also determine what programs are available in the library for rerunning and request that they be presented at a specified time on channels reserved for this purpose. A computer terminal will be interconnected to the system, permitting time-shared access to central computers for data processing, for computer-aided instruction, and for information retrieval. Computer output can either be viewed temporarily on the television screen or hard copy provided by teletype or facsimile. Interconnection to libraries, municipal offices or business will permit specific information to be relayed on request to the home, either in temporary or permanent form. Daily news can be provided on the same basis. Shopping can be done directly on the system, with video information regarding the products displayed as desired; identification coding by the subscriber will confirm the purchase and handle the billing. Reservations can be made directly on the system with instant confirmation. Telemetering of utility meter readings will be accomplished automatically at suitable

intervals; burglar and fire alarms will transmit signals from automatic detectors directly to appropriate agencies. Polling of meters will also be used extensively.

A pilot network containing all of the services outlined above is now being developed for installation at a model-town site near Nara, Japan (Video Information System, 1974). A total of 300 houses out of 1,135 houses in the community will be connected to the system. Services are scheduled to start in mid-1976, with a comprehensive evaluation slated to be completed by the end of 1978. This program should produce an excellent base of data relating to application of telecommunications technology to communication needs, but whatever the results, they must be carefully interpreted in terms of Hawaii's own desires and aspirations.

Technology Research

A representative sample of problems and research areas of current interest in communication technology is indicative of the state of the art and future trends (Gifford and Smith, 1973).

Spectrum Allocation

The electromagnetic spectrum is a very important but limited resource in communication. For some applications there is no reasonable alternative, as for example in mobile communications and satellite transmission. Alternatives for some other applications are awkward or uneconomical. Different portions of the spectrum (HF, VHF, microwaves, optical) have quite different properties for transmission, reception, range, etc. As demand increases, alternatives must be developed and exploited where possible, while priorities for allocation and optimum utilization constantly need re-evaluating.

Modulation, Demodulation and Coding

Among the topics now being emphasized in these fields are signal processing for efficient transmission, data file organization and message switching, network optimization, transmission reliability and security, new modulation and demodulation techniques, and electromagnetic environment control.

Computer Terminals

A variety of general purpose and specialized computer terminals are required to satisfy the many application needs currently and in the future. Large scale integration

(LSI) of electronic circuitry in computer terminals will increase their internal computing capability. For example, an electric typewriter with sufficient computer functions and memory could be used to edit and correct the text of a document; alternatively, it could be programmed to accept a personalized shorthand from the typist to produce full text at the output. As the need for information sharing grows, those terminals which act as the initial and final interface between man and machine will have to become more sophisticated. Optical character recognition may grow as an input mechanism, graphic display systems will be improved to facilitate human interaction, better techniques for operator identification and security of data retrieval will be developed, and methods will be devised for producing cheaper terminals for remote locations which have a low duty factor of usage.

Speech Analysis and Synthesis

Speech analysis is the process which extracts the information-bearing components of speech and converts these into some sort of code. The code may be used for the transmission of speech by the use of a speech synthesizer, the input to a computer or the control of machine operations. A high accuracy can presently be achieved with a "cooperative" speaker who will use a limited vocabulary and speak in precise tones. Significantly more research is needed to accommodate an untrained speaker using a general vocabulary.

Speech synthesis is the inverse process of producing speech from some sort of code. Synthesizers which reproduce programmable combinations of speech elements which have been prerecorded on a magnetic drum have been in use for many years. Other types include the voice tract analog and the spectrum reconstruction technique. From the standpoint of performance and applications, speech synthesis is more advanced than speech analysis. However, bandwidth requirements are high, and bandwidth compression techniques are costly.

Optical Communication

A recent projection of future demand for information transfer indicates that as compared with 1970 our use of voice communications will increase by a factor of five in 1990, video will increase by a factor of 50, data and private wire service by a factor of 70, and written communication by a factor of two. To accommodate these requirements will require enormously expanded transmission capacity. Optical frequencies have the advantage of tremendous bandwidths. Invention of the laser provided

us with a source of coherent light, but unfortunately the limiting effects of weather on optical transmission prohibit all but very specialized or very short range applications. The optical fiber now shows promise as being a viable alternative. Modern fibers may have a central core only a few microns thick, with a dielectric cladding of perhaps a few mils. Much remains to be done in reducing transmission losses, reliable production of fibers and fiber cables, splicing, and connection to the light source as well as to the receiver.

Applications Research

Of equal, and perhaps greater, importance to communication planning are efforts to examine applications in a variety of fields (Communications Technology ..., 1971). Among the most active research programs are:

- citizen-government interaction
- education
- health
- pollution
- transportation
- crime prevention
- emergency service
- human factors
- excessive communication
- international standards

As technological advances produce more economical and efficient ways to provide telecommunications services, we must continue to examine and optimize ways in which to utilize these services toward solution of problems of mankind.

The discussion of communication policy in the next section addresses the problem of relating communication needs to present and future communication resources and communications technology.

COMMUNICATION POLICY

Every society has an array of communication policies, with some policies quite explicit in law and others implicit in cultural traditions and customary procedures. Nowhere is there an overall communication policy embracing all issues and concerns, and perhaps none should be expected. Development of a concern for an overall communication policy is a recent phenomenon, and grows largely from explosive communication technology developments and from efforts in new and developing countries. These countries are often starting the whole business of national life, and they are asking what is the role of communication in their society, and what communication systems are needed. Communication does not often receive a high priority, despite its recognition in developed countries as an essential web of society, and stimulus to social and economic development (Schramm, 1973).

Much of this is changing. Communication policy studies are now appearing in the developing countries and there is the beginning of research into communication policy (Pool, 1973), and of policy science (Lerner and Lasswell, 1951).

Yet there seems to be little systematic concern about comprehensive communication policy on a national level in the United States, and the same is true on the state level in Hawaii. There is, of course high-stake interest and attention to telecommunications policy in many federal areas, such as the Office of Telecommunications Policy, the Federal Communications Commission, and so on. The great uses to which communication systems can be put to use in urban and rural societies has been demonstrated. The needs of the people for a wide range of information, much of it individualized, and the ability of technology to produce systems to provide such services is examined earlier in this report.

What seems lacking in Hawaii and most other places is a comprehensive communication policy, a policy that brings together the complexities of political, social and economic realities, of working with an intricate and shifting mix of public and private enterprise and institutions, while trying to meet very basic needs of people.

Policy in the Communication Era

In a time many are calling the "communication era" with rapid technological changes and resulting communication patterns, there are many questions concerning the

right of people to communicate and consequently how various societies organize, regulate, stimulate, suppress, control, direct and pay for the communication, information and entertainment processes. There are many ways of meeting the communication objectives of a society, and the rational examination of the alternatives is at the heart of what is called communication policy.

To study communication policy means that the policy-making or decision-making processes must be studied. Where do the policies originate? Who decides policy, on the basis of what objectives, through what processes? What kinds of information are used as a basis for policy-making? Are they sufficient? What social, economic and political considerations are involved in communication policy decisions? The real question, as Lasswell notes, is "How much of this pertinent knowledge is available, and how can it be assembled and presented by the time it is wanted?" (Lasswell, 1971). Particularly in a free enterprise system as found in Hawaii and the rest of the United States, there is an often indeterminate mixture of public and private policymaking. And, Hawaii as a state is under Federal regulations as well as international regulations and law agreements, thus further complicating the decision-making process.

Communication and information are at the heart of any society, and there are already many existing policies in Hawaii, often devised ad hoc to meet a particular problem or to respond to a particular pressure or new technology, and often for private rather than public interests.

The new technology includes the communication satellite and the computer. These two innovations alone are revolutionizing ways of organizing and structuring communication systems in societies. This sense of change is likely to be something that will prevail. An early exponent of communication policy, Ithiel de Sola Pool, said: "We are now at the point, on the exponential acceleration of change, where major innovations in our communications system are coming every decade, and there is no reason to expect that acceleration to stop. We are entering a period in which the whole communication system will be in a process of constant flux." (Pool, 1973).

These technological changes mean enormously increased capacities for information processing and distribution. Such increased capabilities can bring great social benefits or they can provide the basis for manipulative use of information by those with control of or special access to the new technologies, with danger to individual and cultural privacy. The changes--particularly the computer --offer the potential for drastically changing the present communication systems toward participatory, user-oriented two-way systems (Schramm, 1964).

Communication policy is concerned with taking a rational look at communication needs and demands in society, and the means presently and potentially available within economic practicality to meet those needs, and devising strategies to bring the needs and means together for the broad benefit of society. And particularly in a society where there is so much private decision-making on communication matters, policy would be concerned with a decision-making environment of public and private interests. Such policy is not intended to make detailed decisions but is rather designed to create a process for equitable communication decision-making--a process which includes the range of community interests. Communication policy interacts with society on all levels and in a great variety of ways--it is not something apart from economic, social and political policy but is often an inherent part of each. It is distinctive enough, however, for separate attention and formulation. The control and direction of communication in a community has far-reaching, highly significant consequences.

Shaping Communication Policy for Hawaii

In Hawaii, there are special communication concerns that arise from the geography of the Islands and the special blend of peoples who live in the Islands.

More specifically, communication policies of a special nature seem inherent in at least three major areas:

1. inter-island communication between parts of the state;
2. distant communication with the rest of the United States and other parts of the world; and
3. intercultural communication within the community.

It is precisely in these areas, among others, that the new communication technology is having its most profound effects.

Hawaii in a real sense is part of the Instant World (Instant World, 1971), the world of communication satellites, computerized and electronic newspapers, submarine cables and cable television. Hawaii is a link in global communications. Yet developments throughout the state have been uneven and usually unplanned, at least in a public interest sense, and there has been little public involvement or participation in the introduction of the new technologies and what is being done with them, and little participatory anticipation of even newer technologies.

Hawaii, of course, has most of the communication policy questions that mainland states share, and an overall policy would have to deal with them as well as Hawaii's special concerns.

An immediate challenge is the distinctiveness of communication needs in Hawaii.. In these distinctive areas Hawaii must generate its own answers to policy questions. Other areas of the United States and the world that have some of Hawaii's distinctive characteristics may help provide some of the answers, and will probably benefit from deliberations in Hawaii.

Inter-Island Communication

What are some of the communication policy questions that arise because Hawaii is a state of islands? What does it mean to a society to be physically separated by stretches of ocean? This separation has an important effect on the cohesiveness of the society, especially where communication is involved. The importance of communication to community is stressed by a UNESCO expert, Gunnar Naesselund, and raises questions concerning statewide equity in communication access, benefits and resources. Naesselund said: "Communication is community. Without it there can be no functioning organized society ... Indeed, a community can extend only as far as it is possible for its members effectively to transmit information, knowledge and ideas to each other. If people are not in communication, there really can be no substance to their collective political or social life (Naesselund, 1974).

A pilot study by Daniel Lerner on the Island of Kauai brings the question home. Lerner examined the effects of remoteness on information, and what modern communication might do in such situations. He noted that "there is reason to think, for example, that the remote population knows its local news as well as the central populace knows theirs, and also has a reasonably good picture of 'headline news' in the nation and world, but lacks some of the detail and the 'process knowledge' that lies between the black headlines and the local information--applied science, the workings of government, etc." He urged, based on his pilot study, an examination of people's "feelings of need and lack of information" (Lerner, 1974).

Communication can be a significant factor in several areas, including a sense of community, political participation and population dispersal. A major policy question is whether the state should strive to give all residents, no matter where they live, equitable access to communication

service, both public and private. And if so, how will the cultural diversity of the state be maintained? What if some residents do not want such services in their community? The question is: Should communication services throughout the state be of generally the same quality, availability and cost--urban or rural, Oahu or neighbor island?

Political participation in Hawaii is difficult at best on a state-wide basis because of the cost and time involved in getting to particular state agencies, boards, or even the legislature. New communication technology, such as two-way cable television, can do much to provide increased access to government meetings and participation in the political system. Of course, political practices would require some changes to open the door to testimony and observation through telecommunications. Use of telecommunications also could increase participation of those with more convenient access to government bodies. Only recently testimony by telephone from the U. S. mainland was permitted in federal court in Honolulu. This could signal innovations in other areas.

Population dispersal is another state policy with obvious relationships to communication policy, especially as it affects equity of communication services. One means of reversing trends of rural-urban migration, for example, is to provide or encourage economic development in depressed areas. A great deal of research in developing countries shows a clear relationship between the growth of the mass media and acceleration of modernization (Frey, 1973).

Another communication strategy in population dispersal could be to provide many of the amenities, and hence attractions, of urban life to rural areas, through the use of telecommunication. Goldmark, for example, discusses the "new rural societies" where urban services are available through telecommunications (Goldmark, 1972). The communication policy questions, of course, are what are the costs involved and how vigorously should the state encourage maintenance of and development of adequate communication systems to provide such services to non-urban areas?

There are many special concerns, then, that derive from Hawaii's archipelagic character. Another special situation involves the entire state's remoteness from the rest of the world, at least in the geographic sense.

[illegible]

[illegible] be ignorant of what is goi[illegible] the rest of the world. Hawaii is served by comm[illegible] satellites and modern submarine cable networks. [illegible] isolation remains, technology has [illegible]ically [illegible], within the lifetime of most of Hawaii's citizens, the potential for interaction with the rest of the world. [illegible] the technology of communication and transportation serves the state, it does so at a substantial cost. The cost of the first hour of direct television by satellite, for example, is $[illegible],950 and $2,1[illegible] for each subsequent hour, which virtually excludes "live" programming as it is received on the Mainland. Even extra costs for videotapes can add $15,000 a month to television station costs. And the cost of getting to the first place outside Hawaii (the nearest is about 2,[illegible] miles) is high by most standards. Many of the "costs" are problems in tariffing and regulations, and are not necessarily inherent in the system.

As a result of this isolation and resultant costs and limitations of communication services enjoyed by most of the rest of the country, Hawaii joins other areas such as Alaska, the Rocky Mountains and Appalachia in a special concern over [illegible] technology and policy. This is one area where the State has developed a communication policy on a national level that puts its citizens on a more or less equal footing with other Americans in domestic satellite use and benefits.

The effect of Hawaii's remoteness raises many questions other than being part of the national domestic satellite system. There is a very real and continuing information deprivation resulting from the cost of getting news, information and entertainment material to Hawaii. Many of these deprivations are based mainly on the cost involved in transportation of materials from the U. S. mainland to Hawaii. [illegible] is compounded by the relativ[illegible] "market" for communication services [illegible] difference [illegible]

[illegible] raises [illegible] question of a positive role [illegible] for its people to get th[illegible] and entertainment servic[illegible] at [illegible]. With the new technologie[illegible] transfer [illegible] information and [illegible] near horizon, what will perhaps [illegible] activity in [illegible] entertainment [illegible] group, for example, [illegible] be a public [illegible] technology and linked [illegible]

to various sources of information elsewhere in the world, such as data banks? Given Hawaii's particular situation of isolation, small market, and high information and entertainment costs, does the state have special responsibilities?

These and other questions directly relating to Hawaii's physical isolation from the rest of the world could all be addressed within a larger framework of policy, as could the state's special concern for intercultural communication.

Intercultural Communication

A third special concern in Hawaii involves the role of communication in a multicultural community. Culture and communication are intimately linked. Communication within a cultural group is vital for its cohesion and continuation, and communication between cultural groups is important for understanding and community peace and progress.

When misunderstanding or lack of essential information occurs, intentional or otherwise, in intercultural communication there are likely to be serious societal problems. This has been starkly evident in many mainland cities in the past several years, and to a lesser but persistent degree within the Hawaii community. Recent state efforts in bicultural educational methods provide one of many current examples.

Less than 35 years ago a vigorous "Americanization" program was under way in Hawaii. Now, cultural diversity is recognized as a healthy and treasured characteristic of the community, one actively pursued and exploited. Hawaii, of course, adds an island characteristic to intercultural relations, where strong antagonism between groups is difficult to sustain. Yet there are very real and potential intercultural difficulties within Hawaii, and efforts continue on a wide front to soften and resolve the conflicts.

Communication technology offers one means by which intercultural relations can be improved--through increased knowledge and understanding of the various groups. There will always be, of course, real clashes of cultural values, and with them hard-to-resolve differences. The mass media takes as one of its tasks the job of presenting a representative view of the different groups in the community, and there is federal concern over "fairness" and community service. Several innovative methods using communication technology are being tried, such as "videotape letters" from one group to another.

Special training for intercultural communicators is an area that seems especially appropriate in Hawaii. Continuing study and monitoring of the intercultural content of the communication systems to determine its impact is another.

The question of language policy with so many people in the state that speak languages other than English, is directly related to communication and culture. Language is a carrier of culture, and is intimately entwined with culture. There are now several examples of public communication in languages other than English, including broadcasting and the print media. What are the public and private responsibilities in the non-English communication systems in Hawaii?

A particular aspect of intercultural communication policy involves newly arrived people from other cultures, particularly those for whom English is not their native language. This is a familiar story in the United States and in Hawaii but satisfactory ways of easing the culture shock remain elusive.

Many of the current discussions and actions concerning "access" to the public communication media involve minority groups who feel they are either being misrepresented by the public media or are not being represented at all.

The questions are many: How are the various cultural groups in Hawaii being portrayed in the public media, are they being treated fairly, what possible dangers are there in inadequate representation, and what else could be done? The role of the private mass media is very strong here, but there are also public questions of great importance.

Discussion and Research Questions

The three areas of special concern to Hawaii also cover many of the common areas of communication policy faced by other states and in other parts of the world. Some are routine and obvious and well-settled generally, others tend to be controlled by decisions made in other policy areas and many questions have been little debated or sparked many disagreements. In the area of social policy and telecommunications, for example, one source (English, 1973) lists several common issues. These are:

1. Subsidy. Are all users of telecommunications expected to pay the full cost of the service to them, or will the government provide a subsidy for services in high cost areas? Or will other means of distributing costs to users be found?

2. Service Availability: What range of telecommunications services should be provided, and to what proportion of the population?

3. Service Quality: The higher the quality of service, generally, the higher the cost, hence back to the question of subsidy.

4. Local Content: On a national level this is a more pressing issue but in Hawaii the question can be raised: Is there a threshold for local content in the community communication system?

Many of the regulatory functions for telecommunication are at the federal and international level. This means State views on these matters should be directed through the federal level.

Development of a communication policy for Hawaii would take into account a wide range of issues. Under the general concept of "access" to public information, for example, there are many daily activities and controversies involved. There are such policy questions as:

- What obligations do public officials have to respond to questions from the news media, from individuals or private groups, from other public officials or bodies?

- What documents must be open to the public, and what are the conditions for restriction of access?

- What public meetings are open, and what are the conditions for closed sessions?

- What should be the position on access for private companies affected with a public interest, or when the state or federal governments give private interests a franchise, special privilege, or some form of public subsidy or relief?

Another policy area involving "access," this time to the public communication media, raises other questions. This is a developing issue in the United States, first with the broadcast media but now also with the print media, as is the fairness doctrine in broadcasting. The basic issue is over what individuals and groups under what conditions have a right of access to the public communication media.

As a corollary to the right of access to public information, to what extent are public bodies responsible for determining the information needs of citizens, and then positively setting out to gather such information, and making it available in a relatively inexpensive and conveniently usable form?

In an age when the ability to communicate is of increasing importance, what are the broad family, public and private responsibilities to ensure that each person has a minimal skill level in communication? Should high school graduates be expected to be able to read and write functionally, as one legislator recently advocated? What are the obligations to provide for specialized information and communication training for those who will become professional communicators? And here simply reading and writing and special skills may not be enough--in an increasingly electronic world, there are needs to be visually literate. Obviously, heavy stress in this area relates to the public education system's objectives or standards in teaching these skills.

There are well-established policy areas in the legal field concerning communication--libel, obscenity, slander, copyright. One growing area concerns privacy, and this is especially important with the new technology, and the increasing use of computers and links between computers. The benefits of vast information gathering and distribution systems are balanced in some ways by the abuses actual and possible through manipulation of information. Privacy was identified by a Hawaii 2000 task force as a major area of concern for the coming decades, and is a countervailing force in a society where more and more information about people is fed into accessible computers.

Cable television is one of the newer communication innovations, one whose potential is seen by many as practically limitless. Franchises have been awarded throughout the State, based in part on projections of user needs and promises to provide certain services. Have those promises and hopes been fulfilled? Cable can provide the two-way interactive characteristic found in telephones, as well as provide many basic services, as detailed earlier in the report. Channels are usually reserved for educational broadcasting, and for government use. In a policy sense, cable is of particular importance because of its two-way capacity to link the islands electronically. Cable television represents the latest introduction of communication technology, and as such deserves special study and attention to anticipate its potential impact.

Policy issues arise in the introduction of new communication technologies. Often it has been the technology that has been leading the way with attention to economic rather than social consequences.

Hawaii has a limited role in controlling the introduction of new communication technologies but it could be a vital role, and there could be input to national and international policy in this area.

Policy Development in Hawaii

There are many current examples of communication policy being developed in Hawaii but there is little in the way of an overall communication policy. Developments have been, as noted above, ad hoc and with little attention to implications in other areas. There have been a variety of ways that policy has developed, and is continuing to be made. A list of specific policy decisions, the context they were developed in, and some of their potential implications are outlined below.

These examples show policy developed through legislation, court rulings, state government actions through federal agencies, and private business and community group action.

- o Domestic satellite system. Hawaii's inclusion in one or more domestic satellite systems is a significant policy development, and as such would be a good case study on state-generated policy affecting national telecommunication policy. One issue for the future is, are there principles involved in this case that apply, if at all, to other communication media and will the domestic satellite policies won (albeit ad hoc) by Hawaii be capitalized on?

- o Underwater cable. A corollary to the domestic satellite case is the recent completion of a third underwater cable to Hawaii from the U. S. Mainland. This choice involved many technical matters, with discussion among the common carrier and state and federal agencies going back several years. The questions of reliability, costs and capacities can overwhelm a layman, and some argue the matter is too complex for broad participatory decision-making. People in Hawaii will be paying for part of the investment in the third cable--as compared, say, to the costs of increased use of existing satellite capacity. Recognizing that there are many complex technical and economic factors and

tradeoffs behind the decision for underwater cable, would not a case study of the decision-making process in this important matter be valuable for the state? It is argued with justification that Hawaii needs both satellite and cable service, so as not to be completely dependent on one system or the other. Thus it is not a matter of cable or satellites--but of what is the proper mix to serve the users in the state. One question quickly becomes, how much backup is enough, at what cost, to the people who will be using it and paying for it? And how much say can they and will they have in the decisions?

- Newspaper Preservation Act. This could be a case study on how legislative action on the state level (also on the national level) affects communication policy. The state determined in 1972 that the two Honolulu daily newspapers can, for the sake of maintaining two separately owned newspapers and editorial policies, operate in a business manner that would otherwise not be acceptable under anti-trust laws. The policy question is what, if any, obligations or responsibilities do the newspapers acquire for the special privilege granted by the legislature? This issue in fact has been raised in the community and the 1975 Legislature.

- Campaign Spending Limitation. This law, designed to control election spending, intrudes on free expression. One policy implication is that the state has determined that there are some cases where simply having enough money to spend on mass media messages is not enough, that there should be some communication equity in the election contests, at least between those with great amounts of money and those with significantly lesser amounts. While this particular policy applies only to election campaigns, the principle involved could extend to other areas of social issues and debate, where one particular point of view dominates the public media because it can outspend all other views: At the national level, "counter-advertising" is a case in point.

- "Sunshine" or Open Meeting and Record Laws. This situation is particularly interesting because such laws were sought by a wide variety of community volunteer groups, showing another way communication policy can be formed. The then-current policy on

meetings was found to be inadequate by a volunteer community group in 1971, and a citizens' effort was undertaken to change the law, with a "sunshine" bill passing in April 1975. The broader policy implications of the "sunshine" concept itself, of course, are a more open society with more public decision-making in the political area, and more participation by the public, with wider availability of government information to the public. A further question is, in a practical way, how much is the society willing to spend in providing information? On the national level, a Freedom of Information Act is still shaking down.

- Press Conferences by Public Officials. This example shows how communication policy can be developed through court action undertaken by the news media and entered into by community groups. The communication policy question involved is, what obligations are there for officials to respond to news media questions? In a federal judicial declaration, the policy in the specific recent incident was that a public official may not discriminate among various news media representatives when the official holds a news or press conference.

- Public Television. Educational or public television planning goes back at least 15 years in Hawaii, and offers a good example of policy development over a period of time, involving the introduction of a new communication system into the state. The question of funding public television is a current issue in the state. Access to federal funding and programming also should be an issue.

- Public Radio. Investigations are being started to determine if there is a need for public radio in Hawaii, and if so, what are those needs and how can they be met? How does an institution go about determining such needs?

Many more examples might be given. In the development of communication policy for Hawaii, the earlier and current cases could yield many insights on policy formation.

Development of a communication policy will require knowledgeable people, a survey of available research on the matter, review and case studies of examples, research on the questions of special concern to Hawaii, and wide involvement of people who use the communication systems and those who provide the services. A wide range of inputs will--perhaps through a Communication Planning Council--be needed from academic experts, government officials, and

industry representatives, including common carriers, mass media, manufacturers, and those in research and development. Users, both in commercial and public service areas, have a major role, one which should not be lost in technical complexities. There are many dilemmas in developing communication policy, but in the "communication era," a continuation of an ad hoc approach might create more severe dilemmas and contradictions.

Many issues arise when we set out to plan communication resources for [illegible]. Three starting points are identified:

- Communication is an essential resource, the development of which can be planned.
- Communication as a resource has a unique characteristic; when communication is cooperative, information sharing does not deplete or use up the shared information and quite often increases that information; communication resources should be abundant rather than scarce.
- Communication resources can be used to conserve, develop, and manage other essential resources; telecommunication can sometimes be used to conserve transportation; communication resources can support the development of economic resources; communication resources are required for the management of energy and most other resources.

Below are listed some of the communication planning issues likely to be important in Hawaii.

Specific Issues

1. Should there be an equity in communication service throughout the State of Hawaii? Should the residents of Kauai, for example, have generally the same communication services as the residents of Oahu? Is there a very good policy reason why the communication services should not be equitable?

2. Should all citizens of Hawaii have equal access to the sources of communication (TV, newspaper, broadcast, library, etc.) regardless of geographical location or ability to pay?

3. Should local review boards be established for hearing complaints about [illegible] renewal applications of local radio and TV broadcasters? Presently, all such actions are handled by the Federal Communication Commission in Washington.

4. To what extent should [illegible] agencies responsible for [illegible] needs of the members [illegible] little effort is expended [illegible] communication needs.

5. What communication resources are needed to enhance Hawaii's role as a center for think industries?

6. Who in Hawaii should undertake the necessary experimental pilot projects to demonstrate and evaluate the potential of new communication technologies?

7. Should the State of Hawaii require all schools to train students in a full range of communication skills--not only listening, speaking, reading and writing, but also the use of cameras, typewriters, video tape, computer terminals and other newer technologies? How will these communication skills be tested?

8. Should public officials assume the responsibility of providing alternate means for participation in public meetings? Room space and transportation considerations limit attendance of interested citizens. Should the possibility of "telecommunicating" to public meetings be developed?

9. Should the State of Hawaii, because of the difficulties in obtaining information from outside the State, assume a special responsibility for providing information for the residents of the State? Should the State subsidize certain information services? If so, which ones?

10. Under what conditions, if any, should an individual or a group have a <u>right of access</u> to public communication media?

11. What are the responsibilities of public officials in providing information to the public?

12. Who should take the responsibility for exploring the public, private sector media, and government priorities for near-term and long-term communication improvement for Hawaii?

13. Should a special "clearing house" for information about our communication resources be established?

14. Who should be responsible for planning the fuller utilization of existing but underused communication resources, for instance, the "extra" channels on CATV, especially those dedicated to public access, education and government?

15. Should the government encourage the use of public media in Hawaii to enhance the cultural solidarity of minority groups?

16. Should the State of Hawaii subsidize the experimental uses of new communication technology?

17. Should the State of Hawaii launch its "own" communication satellite or lease satellite channels for "public" uses?

18. Who in Hawaii should be entrusted to determine our communication needs?

19. How should we determine what our future communication needs will be?

20. Should we establish in Hawaii an independent Communication Council to conduct in-depth studies on basic issues on communication planning?

Anticipatory Democracy

In the spirit of Hawaii 2000, a public discussion of basic issues on communication planning can help to enable us to anticipate and plan for the futures we prefer for Hawaii. For democracy to work well, appropriate communication resources are required. Naturally, a similar claim can be made for most other sectors of our community.

It has been our purpose in this paper to sketch a framework within which basic issues and questions can be discussed. We look forward to your reactions.

BIBLIOGRAPHY

Specific References

An Assessment of Educational Needs for Learners in Florida, Tallahassee: Department of Education, 1970.

Baldwin, Thomas F. and Stuart H. Surlin, "A Study of Broadcast Station Licence Application Exhibits on Ascertainment of Community Needs," Journal of Broadcasting, 14:157-169, 1970.

Bystrom, John, "The PanPacific Education and Communication Experiments by Satellite: The PEACESAT Project." A paper presented before the Royal Society of London, September, 1974.

Communication Technology for Urban Improvement. Washington, D. C.: National Academy of Engineering, 1971.

COMSAT, Communication Satellite Corporation Annual Report, 1974.

Dervin, Brenda, "The Everyday Information Needs of the Average Citizen," in Manfred Kochen and Joseph Donahue, Information for the Community, Chicago: American Library Association, 1974.

English, H. E. (ed.), Telecommunications for Canada: An Interface of Business and Government, Toronto: Methuen, 1973.

Frey, Frederick W., "Communication and Development," in Pool and Schramm (eds), Handbook of Communication, Chicago: Rand-McNally, 1973.

Gerbner, George and others (eds.), Communications Technology and Social Policy, New York: John Wiley, 1973.

Gifford, R. P. and Jared S. Smith, Telecommunication Research in the United States and Selected Foreign Countries, Vol. II, Washington, D. C.: National Academy of Engineering, 1973.

Goldmark, Peter, "Communication and the Community," in Scientific American, Communication, San Francisco: W. H. Freeman, 1972.

Huizinga, Gerald, Maslow's Need Hierarchy in the Work Situation, Netherlands: Wolters-Noordhoff Publishing, 1970.

Instant World, Ottawa: Communications Canada, 1971.

International Broadcast Institute, Report of Annual Meeting in Mexico City, 1974.

IRADES, Human Futures: Needs, Technologies, Societies, London: IPC Science and Technology Press, 1974.

Katz, Elihu and others, "On the Use of Mass Media for Important Things," American Sociological Review, 38, 164-181, 1973.

Kollen, James H., "New Perspectives on the Travel/Communication Tradeoff," Bell Canada, December, 1974.

Lasswell, Harold D., Pre-View of Policy Sciences, New York: Elsevier, 1971.

Lerner, Daniel and Harold D. Lasswell (eds.), The Policy Sciences, Stanford: University Press, 1951.

Lerner, Daniel, "Kauai Pilot Study on the Uses of Communication Technology," Honolulu: East-West Communication Institute, 1974.

Maslow, Abraham, Motivation and Personality, New York: Harper and Row, 1970.

McGuire, William J., "Psychological Motives and Communication Gratification," in E. Katz and others (eds.), Annual Review of Communication Research, Beverly Hills: Sage Publications, 1974.

McHale, John, "The Changing Information Environment," in Conference Board Report on Information Technology, 1972.

McHale, John, World Facts and Trends, New York: Collier Books, 1972.

Metropolitan Regional Council, New York: World Trade Center.

Naesselund, "Communication Policies in UNESCO's Programme," Paris: UNESCO, April 1974.

Pierce, J. R., "Communication and Transportation." A paper presented in Honolulu at NASA/Earth 2020, September, 1974.

Pool, Itniel de Sola, "The Rise of Communications Policy Research." A paper presented at the International Broadcast Institute Conference, in Nicosia, October 1973.

Resources and Man, San Francisco: W. H. Freeman, 1969.

Simonds, Wm. A., The Hawaiian Telephone Story, Honolulu: Star-Bulletin Printing Co., 1958.

State of Hawaii Data Book, Honolulu: State Department of Planning and Economic Development, 1974.

Surlin, Stuart H. and Les Bradley, "Ascertainment through Community Leaders," Journal of Broadcasting 18: 97-107, 1974.

Telecommunication Plan for Australia, 1974.

Theobald, Robert and J. M. Scott, Teg's 1994, Chicago: Swallow Press, 1972.

Turow, Joseph, "Talk Show Radio as Interpersonal Communication," Journal of Broadcasting, 18: 171-179, 1974.

UNESCO, "The Training of Communication Planners," Kuala Lumpur, Malaysia, December 1974.

Video Information System, Tokyo: Seikatsu Eizo Joho System Development Association, 1974.

Telecommunications and the State of Hawaii, Washington, D. C.: Office of Telecommunication, 1971.

General Sources

Baer, W. S. Cable Television: A Handbook for Decisionmaking. Santa Monica, CA: The Rand Corporation, 1973.

A readable discussion of the issues at the local level related to the full utilization of the potential of broadband cable.

Cherry, Colin. World Communication: Threat or Promise? New York: Wiley-Interscience, 1971.

An excellent examination of issues raised by the globalization of human communication.

Conference Board. Information Technology. New York: The Conference Board, 1972.

An examination of the potential of the newer information technologies and their social implications.

Instant World. Ottawa: Communications Canada, 1971.

A highly readable summary of a major Canadian effort in communication planning.

Maddox, Brenda. Beyond Babel: New Directions in Communications. New York: Simon and Schuster, 1972.

An account of the development of telecommunications technologies.

Martin, James. Future Developments in Telecommunications. Englewood Cliffs, N. J.: Prentice-Hall, 1971.

A semi-technical discussion of present and future telecommunication technologies with attention to their possible interconnections.

Michael, D. On Learning to Plan and Planning to Learn. San Francisco: Jossey-Bass Publishers, 1973.

An approach to planning that suggests that planning itself is a kind of community learning.

Pool, Ithiel de Sola and Wilbur Schramm (eds.). Handbook of Communication. Chicago: Rand McNally, 1973.

General reference source on the social science of human communication.

Rivers, W. L. and M. J. Nyhan. Aspen Notebook on Government and the Media. New York: Praeger Publishers, 1973.

A conference report on the relationship between government and the media. Contains an extensive discussion of communication issues.

Schiller, H. I. Mass Communications and the American Empire. Boston: Beacon Press, 1971.

A critical review of developments in mass communication

Scientific American. Communication. San Francisco: W. H. Freeman and Co., 1972.

A set of readable and well-illustrated articles about recent developments in the field of communication. Includes: Pierce, "Communication"; Busignies, "Communication Channels"; Inose, "Communication Networks"; Kretzmer, "Communication Terminals"; Goldmark, "Communication and the Community"; Gerbner, "Communication and Social Environment"; Emerson, "Communication and Freedom of Expression".

Smith, R. L. The Wired Nation. New York: Harper and Row, 1972.

A readable account on cable television and its possible lines of development.

Sommerlad, Lloyd. "National Communication Systems: Some Policy Issues and Options." Paris: The Unesco Press, 1975.

A systematic review of questions in planning national communication systems.